UNDERGROUND
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29 May 2001
File No. 27285-005

Mr. Brian Mossman
Boeing Realty Corporation
3855 Lakewood Blvd.
Building 1A MC D001-0097
Long Beach, CA 90846

Subject: **Extended Soil Vapor Extraction Pilot Test Workplan**
Former Buildings 1 and 36
Former Boeing C-6 Facility
Los Angeles, California

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This Extended Soil Vapor Extraction (SVE) Pilot Test Workplan has been prepared to address soils impacted with volatile organic compounds (VOCs) in localized areas of Parcel C, at the former Boeing C-6 Facility (subject property), in Los Angeles, California.

The focus of the extended pilot test will be in the vicinity of former Buildings 1 and 36. Subsurface soils in this area contain chlorinated solvents, primarily trichloroethene (TCE) and 1,1-dichloroethene (1,1-DCE). In 1991, four underground bulk storage tanks that formerly contained degreasing solvents (15T through 18T) were removed from the area south of Building 36 and north of Building 1. A 48-hour pilot test was performed in this area in 1993, however, insufficient data was collected for the evaluation of full-scale implementation. The purpose of the extended pilot test is to collect VOC mass removal and vacuum/flow influence area data to evaluate the need for full-scale implementation. A secondary benefit of the extended pilot test will be overall VOC mass reduction in the soil source area.

A second area of Parcel C in the vicinity of former Building 2 is also impacted with VOCs, although not as extensively as the Building 1 and 36 area. This area is currently under investigation and impacts appear to be related to machining operations. Based on the results of the ongoing investigation, Boeing Realty Corporation (BRC) may propose a second extended pilot test in this area for the same purposes stated above.

1.0 BACKGROUND

1.1 SITE LOCATION AND DESCRIPTION

The subject property comprises approximately 170 acres at 19503 South Normandie Avenue in Los Angeles, California (Figure 1). The property is bordered on the north by West 190th Street; on the east by railroad tracks and South Normandie Avenue; on the south by Montrose Chemical Company and residential properties; and on the west by Western Avenue, Capitol Metals, and International Light Metals (ILM).

In 1952, the Douglas Aircraft Company (DAC) used the facility to manufacture aircraft and aircraft components until approximately 1992. DAC used the subject parcel for storage and warehousing until 1996.

Aboveground and underground structures have been reportedly removed from the site. The site is currently being graded for redevelopment, which is scheduled to begin in the second half of 2001.

1.2 HYDROGEOLOGY/GEOLOGY

The hydrogeologic units relevant to this scope of work are comprised of Holocene and Pleistocene-age alluvium deposits. The upper portions of the site/area geology are composed of the Bellflower Aquiclude (ground surface to approximately 140 feet bgs) consisting of clays and silts, and flood plain deposits composed of silt and sand grading into thinner beds with minor amounts of clay. The upper 30 to 35 feet of the vadose zone is finer grained than the lower 25 to 30 feet. The Gage Aquifer (approximately 150 to 180 feet bgs) underlies the Bellflower Aquiclude (Montgomery Watson, 1994).

At the site groundwater occurs at approximately 60 to 70 feet bgs in a semi-perched aquifer flowing south-southeast at an approximate hydraulic gradient of 0.0007 feet per foot (ft/ft) to 0.0027 ft/ft (Kennedy/Jenks 2000b).

2.0 INVESTIGATION RESULTS - SUBJECT AREA

The site has undergone numerous phases of site characterization to define the vertical and lateral extent of VOCs in the soil and groundwater in the vicinity of former Buildings 1 and 36. Presently, soil data collection by Kennedy/Jenks continues in the vicinity of former

Buildings 1 and 36 to better define the distribution of VOC concentrations in soil. The area targeted for this extended SVE pilot test includes VOC-bearing soils from the ground surface to approximately 60 feet bgs. These soils contain TCE concentrations of up to 97,000 micrograms per kilogram (µg/kg) beneath the former basement near the northeast corner of Building 1 and the southeast corner of Building 36

2.1 INITIAL PILOT TEST

In August 1993, Montgomery Watson performed an initial 48-hour SVE pilot test between Buildings 1 and 36 to estimate the vacuum radius of influence (ROI) and mass removal rates. The test used Well RW-1 as the extraction well and temporary nested probe locations P-1 and P-2 as the observation points. Wells P-1 and P-2 were constructed with discrete soil probes set at approximately 20 feet, 40 feet, and 60 feet bgs.

The limitations of the previous testing performed by Montgomery Watson include:

- Only two data values under non-constant conditions were used for the ROI calculations.
- Only 11 data points (vacuum and flow data) were collected over the 2-day period. Additional data points are necessary for full-scale system evaluation.
- Vacuum data showed decreasing trends throughout testing; therefore, steady-state testing conditions were not achieved.
- Mass removal rate was approximately 1.5 pounds of VOCs per hour at a flowrate of approximately 20 to 33 standard cubic feet per minute (scfm).

It should be noted that during site demolition activities, vadose zone test well RW-1 was destroyed. Vapor monitoring points P-1 and P-2 remain intact.

3.0 EXTENDED PILOT TEST PURPOSE, SCOPE, AND DESIGN BASIS

3.1 PURPOSE

The purpose of the extended pilot test is to obtain design parameters for evaluation of a final SVE soil remedy.

3.2 SCOPE

It is anticipated that this extended SVE pilot test will operate for approximately 90 days during on-site construction and grading activities. During this time, SVE operational parameters will be collected and evaluated. These will include soil vapor concentrations, mass removal rates, flow and vacuum ROI, and treatment system efficiency. During extended pilot test operation, the data will be reviewed to evaluate if continued SVE operation is advantageous to the site.

3.3 DESIGN BASIS

Selection of the extended pilot test methodology was based on the initial SVE pilot test (Montgomery Watson 1994) and regulatory requirements as summarized below:

- A trailer-mounted SVE blower package with a South Coast Air Quality Management District (SCAQMD) various locations permit is readily available and can be mobilized immediately.

- The pre-permitted SVE system has an air flowrate capacity of up to approximately 250 cubic feet per minute (cfm) at 68 inches of water column (in. H_2O).

- Based on the initial pilot test, anticipated concentrations of extracted vapors will be approximately 3,000 to 4,000 ppmV initially, and should rapidly attenuate with time.

- Activated carbon will be used for treatment of recovered vapors. Two 400-lb carbon beds will be used in series. Change-out of the primary carbon bed may be required within the first week of operation, however, the frequency of change-outs should decrease rapidly as VOC mass is removed.

- The upper 30 to 35 feet of the vadose zone consists of finer grained silts and the lower 30 feet consists of sandy silts. To effectively treat these two zones, a multi-depth well, VEW-1, is proposed.

- The SVE wellhead connection to the vapor recovery piping can be made at-grade. Similarly, piping runs will be installed aboveground.

4.0 EXTENDED PILOT TEST IMPLEMENTATION

4.1 PILOT TEST WELL INSTALLATION

The pilot test well will be dual-completed to accommodate the flow and vacuum conditions that may be present in the two primary geologic horizons of the vadose zone. The upper well completion will be 2-inch inner diameter (ID) polyvinyl chloride (PVC) well casing and screen with a 0.020-inch slot screened from approximately 15 to 35 feet bgs. The lower well completion will be constructed from 2-inch ID PVC casing and screen with a 0.020-inch slot screened from approximately 50 to 65 feet bgs. The screened intervals may be adjusted in the field based on local lithology and field screening for VOCs with the screens being placed to intersect the most highly VOC-impacted zones. The screened intervals will be packed with #3 sand, bentonite seals will be placed from approximately 36 to 49 feet bgs (between the well casings), and bentonite grout will be placed from approximately 15 to 3 feet bgs. The remaining annular space will be backfilled with drill cuttings until the well casings are connected to the SVE system with a wellhead installation. The location of proposed well VEW-1 is shown on Figure 2. A well detail is included on Figure 3.

4.2 PILOT TEST SYSTEM DESIGN AND CONSTRUCTION

The temporary SVE pilot test equipment will consist of a fenced treatment compound, aboveground piping, two 400-lb granular activated carbon canisters for off-gas treatment, a water knockout, and a vacuum blower. A schematic of the VES unit and activated carbon treatment vessels is shown on Figure 4.

4.2.1 Piping

The piping will consist of 3-inch-diameter, schedule 80 PVC. Piping from the treatment well will be routed to PVC header pipes located in the treatment compound (Figure 2). Well VEW-1 will be equipped with ball or gate valves to regulate flow, a labcock sample valve,

and a pitot tube or orifice plate to measure flow. The main header pipe leading to the vapor extraction equipment will be equipped with a labcock sample valve and flow-sensing device for SCAQMD permit compliance monitoring.

4.2.2 Pilot Test Equipment Compound

To accommodate the trailer-mounted VES unit, a 6-inch thick course of aggregate will be placed in an approximately 20 by 30-foot area in the northeast corner of the site near the former Building 36. (Figure 2). The aggregate will be compacted to provide a stable, level surface. The VES equipment will be enclosed by an 8-foot-high chain-link fence with 3-strand barbed wire. The fence will have a swing gate for access.

4.2.3 Electrical Service

Electrical service (likely a temporary construction power pole) will be installed near the treatment compound. Electrical power connection will be made to the treatment equipment in accordance with local building codes pertaining to construction jobsite service and manufacturer specifications.

4.2.4 Equipment Startup and Operation and Maintenance

For the duration of the pilot test, weekly operation and maintenance of the equipment will be performed to ensure that SCAQMD permit compliance is met, operation parameters are recorded and optimized, and maximum mass removal is maintained.

Data collected during system operation will include power readings, influent vapor velocity, vacuum, temperature, and inlet/outlet VOC concentrations. VOC concentrations will be measured using an FID or PID. These measurements will be supplemented with monthly Tedlar bag or Summa canister influent and effluent samples to verify field measurements and calculate mass removal rates. Air samples will be analyzed for VOCs by EPA Method TO14.

4.3 PERMITTING

A SCAQMD-pre-permitted, trailer-mounted SVE unit will be operated under an extended pilot test basis. Because the proposed system is within a construction site on a temporary basis, it is anticipated that no building or electrical permits will be required.

The proposed vapor extraction well is within the vadose zone; therefore, permits from the Los Angeles County Department of Health for installation are not required.

5.0 HEALTH AND SAFETY

The site-specific Health and Safety Plan (HASP) prepared by Kennedy/Jenks for worker safety will be amended prior to system installation and operation to include construction oversight, and operation and maintenance of the treatment system.

6.0 UNDERGROUND UTILITIES

Underground utilities within Parcel C have reportedly been removed as part of site demolition. Installation of new utilities within the pilot test area will be identified and coordinated with the site developer, if necessary.

7.0 PERSONAL PROTECTIVE EQUIPMENT (PPE)

All site personnel will be equipped, at a minimum, with Level D safety gear (e.g. hard hat, steel-toed boots, and traffic vest). Because dust may be a problem and chlorinated hydrocarbons and moderate concentrations of metals are known to exist in site soils, workers should monitor ambient dust levels using Occupational Safety and Health Administration (OSHA)-approved dust monitoring equipment. If dust levels exceed HASP requirements, dust control and/or proper PPE such as respirators should be used. HASP requirements will be implemented during system operation.

8.0 REPORTING

Upon completion of the extended pilot test, a report will be prepared describing system operation, monitoring activities, and system performance. A well construction log and a discussion of system construction specifics will be included with the report. VOC monitoring data will be included in tables, figures, and graphs to illustrate destruction efficiency and the volume VOCs removed to date. Other measurements taken in the field will also be presented in tabular format.

This opportunity to be of service is appreciated. If you have any questions, please do not hesitate to contact the undersigned.

Sincerely yours,
HALEY & ALDRICH, INC.

Richard M. Farson, P.E.
Senior Engineer

Scott P. Zachary
Vice President

Enclosure

References:

Kennedy/Jenks. 1996. Phase I Environmental Assessment, Douglas Aircraft C-6 Facility, Parcel C. May.

Kennedy/Jenks. 2000a. Areas 4 and 5 - Phase II Soil Characterization, McDonnell Douglas Realty Company, C-6 Facility, Los Angeles, CA, Volume I. August.

Kennedy/Jenks. 2000b. Groundwater Monitoring Report, 2nd Quarter 2000, Boeing Realty Corporation's C-6 Facility, Los Angeles, CA. July.

Montgomery Watson. 1994. Conceptual Design of Final Soil and Groundwater Remediation System at the Douglas Aircraft Company. March.

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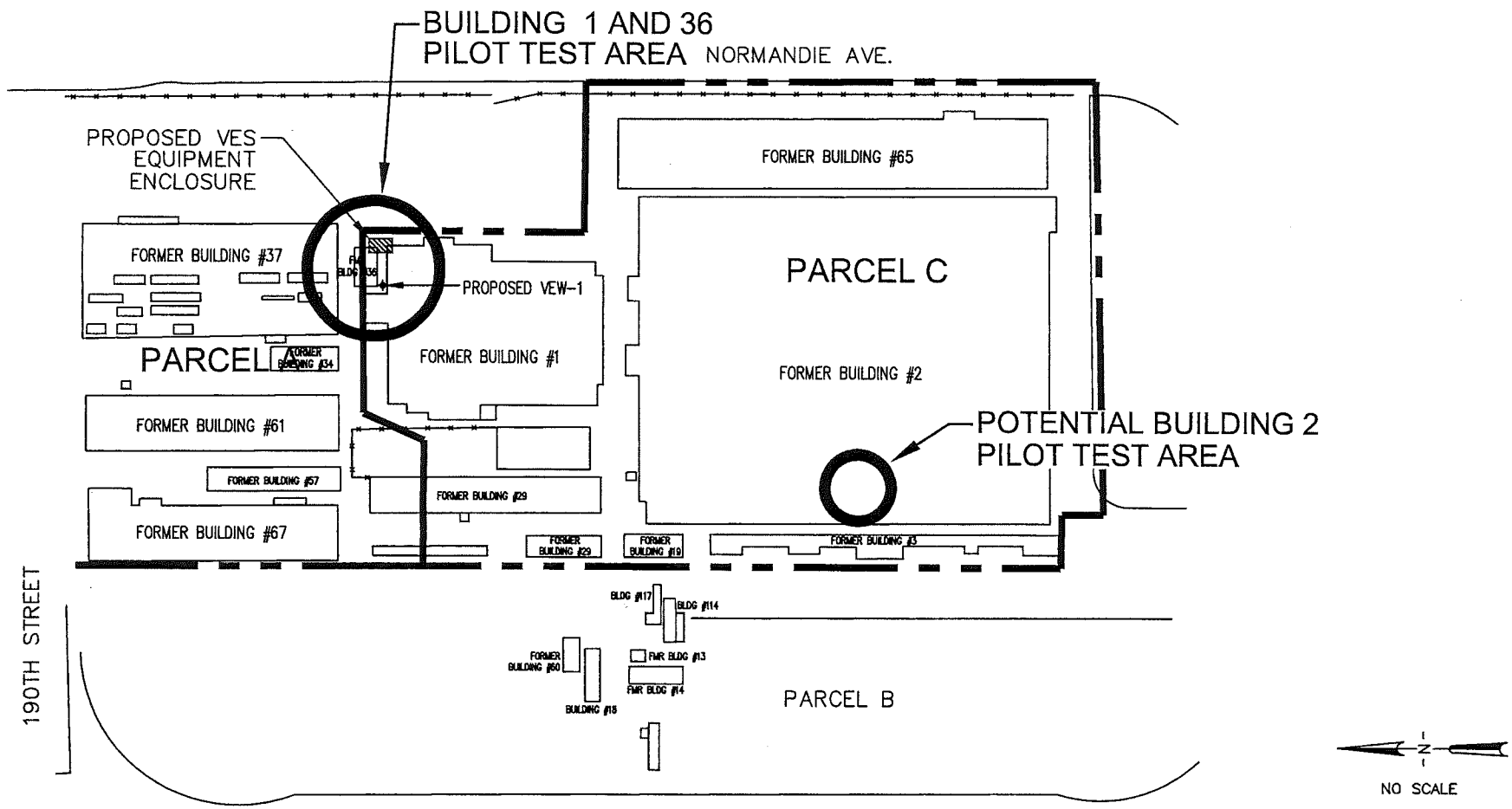

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FIGURE: 1

EXTENDED VES PILOT TEST SITE PLAN

SCALE: NO SCALE

MAY 2001

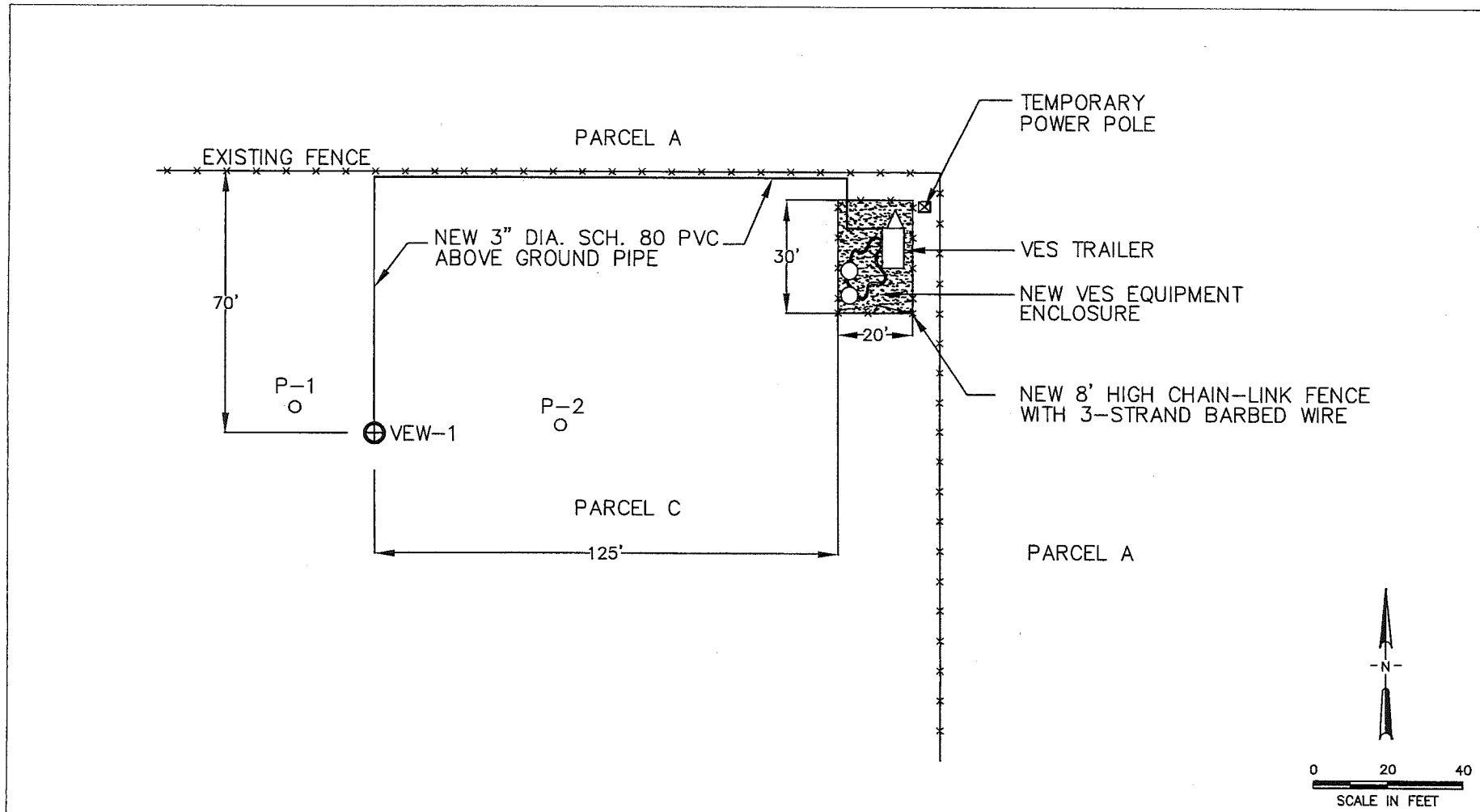

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FIGURE: 2

EXTENDED VES PILOT TEST EQUIPMENT LAYOUT

SCALE: 1" = 40'

MAY 2001

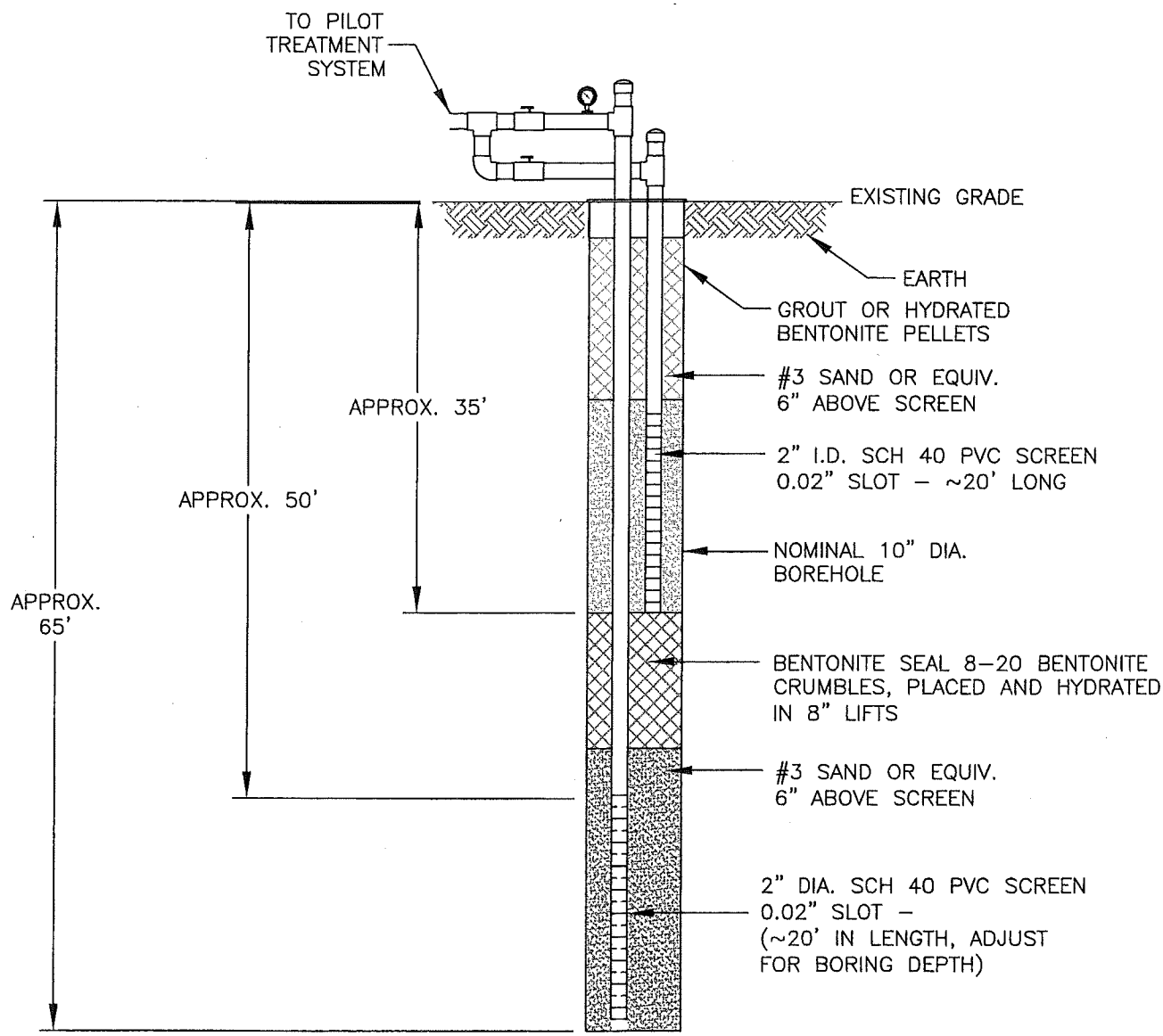

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FIGURE: 3

EXTENDED VES PILOT TEST
SOIL VAPOR EXTRACTION WELL DETAIL

SCALE: NOT TO SCALE

MAY 2001

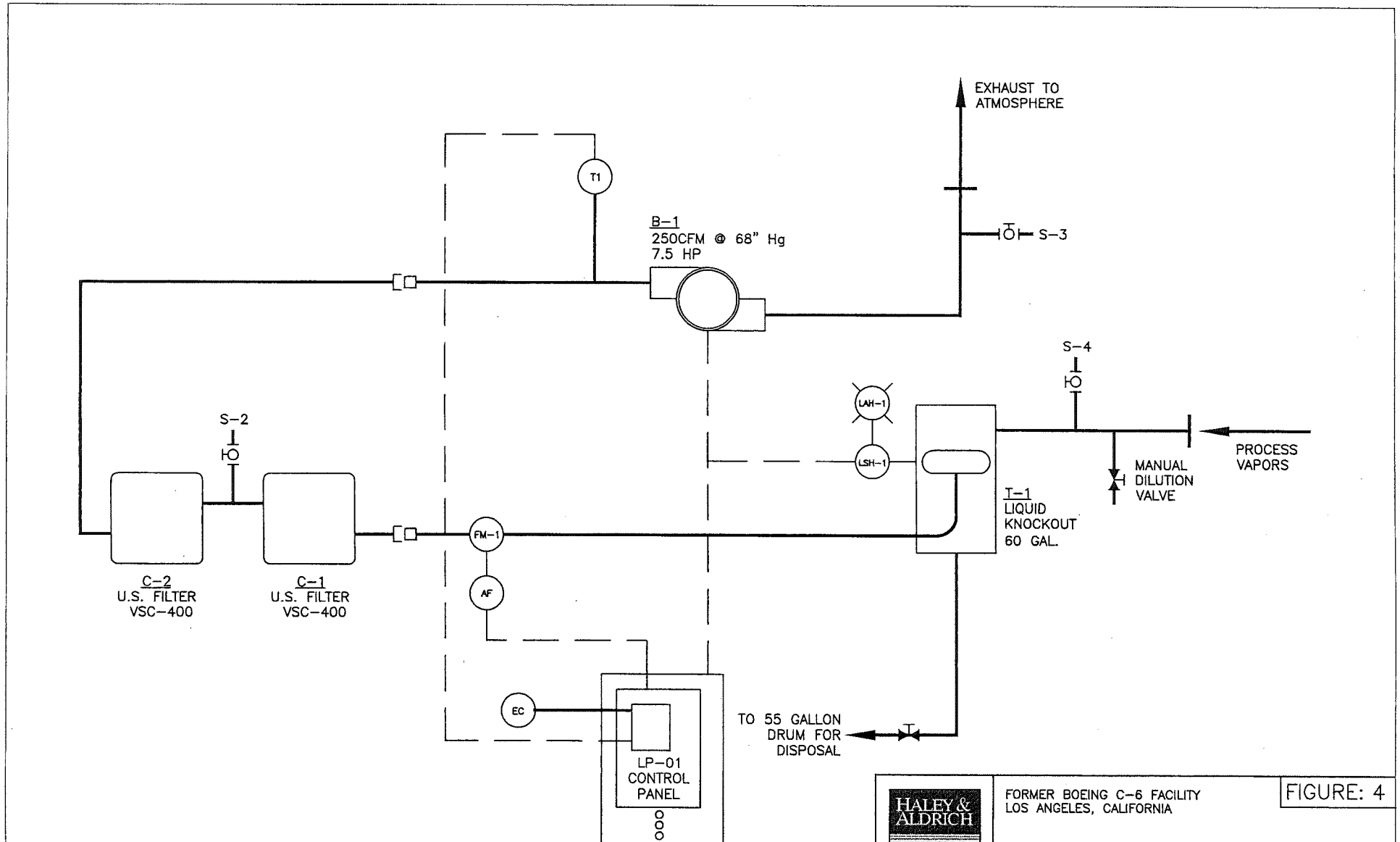

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FIGURE: 4

EXTENDED VES PILOT TEST EQUIPMENT SCHEMATIC

SCALE: NO SCALE

MAY 2001

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31 May 2001
C6-BRC-T-01-011

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
Los Angeles Region
320 W. 4th Street, Suite 200
Los Angeles, CA 90013

BOEING

Attention: John Geroch

Subject: **EXTENDED SOIL VAPOR EXTRACTION PILOT TEST WORKPLAN FOR BOEING REALTY CORPORATION, FORMER C-6 FACILITY, 19503 SOUTH NORMANDIE AVENUE, LOS ANGELES, CA**

Dear Mr. Geroch:

Please find enclosed for your review, a copy of the subject document prepared by Haley & Aldrich, Inc. for Boeing Realty Corporation.

If you have any questions concerning this document, please contact the undersigned at 562-593-8623.

Sincerely,

Stephanie Sibbett
Boeing Realty Corporation

Cc: Mario Stavale, Boeing Realty Corporation
Scott Lattimore, Long Beach Division

enclosure